CLAIMS

We claim:

1. A method for treating a neuronal deficiency, comprising:

administering bone marrow-derived cells to an individual having a neuronal deficiency, wherein the administering of the bone marrow-derived cells induces a formation of new neurons in a nervous system of the subject; and

ameliorating at least one symptom of the neuronal deficiency.

2. The method of claim 1, wherein said neuronal deficiency arises from a disorder selected from the group consisting of abnormalities of the central autonomic systems, congenital disorders and disorders arising from teratogen exposure, demyelinating diseases, diseases of peripheral nerves, disorders of the hypothalamus and pituitary, disorders of movement, disorders of the spinal cord and vertebral column, epilepsy, hypoxia, increased intracranial pressure, infectious disease, neoplasia, neurodegenerative disorders, neuronal disorders associated with aging and senile dementia, nutritional disorders, perinatal neuropathologies, radiation damage, schizophrenia, single gene disorders, toxic disorders, trauma, vascular disease, and psychiatric disorders other than schizophrenia.

3. The method of claim 2, wherein said neuronal deficiency is not a neuron deficiency arising from a disorder selected from the group consisting of:

a lysosomal or peroxisomal disorder, Zellweger's disease, human immunodeficiency virus (HIV) infection, multiple sclerosis (MS), adrenoleucodystrophy, adrenomyeloneuropathy, a metachromatic leucodystrophy, a sulphatide lipidosis, globoid cell leucodystrophy, amyotrophic lateral sclerosis, amyotrophic lateral sclerosis with frontal lobe dementia, a bone marrow ablation treatment, lymphoreticular disorders, metastases of tumors which do not arise in the nervous system, infantile acid maltase deficiency (Pompe's disease), Ceroid lipofuscinosis, a deficiency of GM2 gangliosidase, Sanfilippo's disease, leucodystrophy, systemic lupus erythematosus, thrombophilia associated with antiphospholipid antibodies or polycythemia, and anemia including Sickle cell disease, beta-Thalassemia major, and other thalassemias.

4. The method of claim 1, wherein said bone marrow-derived cells are autologous.

5. The method of claim 4, wherein said autologous bone marrow-derived cells are genetically modified.

6. The method of claim 1, wherein said bone marrow-derived cells are allogeneic.

7. The method of claim 6, wherein said allogeneic bone marrow-derived cells are genetically modified.

8. The method of claim 1, wherein said bone marrow-derived cells are administered in conjunction with a neuronal factor.

9. The method of claim 8, wherein said neuronal factor is selected from the group consisting of: nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF), neurotrophin-3, -4, -5, –4/5 and -6 (NT-3, -4, -5, -4/5, -6), ciliary neurotrophic factor (CNTF), glial-derived neurotrophic factor (GDNF), growth promoting activity (GPA), luteinizing hormone releasing hormone (LHRH), *KAL* gene, insulin, insulin-like growth factor-I-alpha, I-beta, and -II (IGF-I-alpha, I-beta, -II), interleukins (*e.g.*, IL-2, IL-6, and the like), platelet derived growth factors (including homodimers and heterodimers of PDGF A, B, and v-sis), retinoic acid (especially all-*trans*-retinoic acid), fibroblast growth factors (FGFs, *e.g.*, FGF-1, -2, -3), epidermal growth factor (EGF), leukemia inhibitory factor (LIF), the neuropeptide CGRP, vasoactive intestinal peptide (VIP), gliobastoma-derived T cell suppressor factor (GTSF), transforming growth factor alpha, epidermal growth factor, transforming growth factor betas (including TGF-β1, -β2, -β3, -β4, and -β5), vascular endothelial growth factors (including VEGF-1, -2, -3, -4, and -5), stem cell factor (SCF), neuregulins and neuregulin family members (including neuregulin-1 and heregulin), netrins, galanin, substance P, tyrosine, somatostatin, enkephalin, ephrins, bone morphogenetic protein (BMP) family members (including BMP-1, -2, -3 and -4), semiphorins, glucocorticoids (including dexamethasone), progesterone, putrescine, supplemental serum, extracellular matrix factors (including laminins, fibronectin, collagens, glycoproteins, proteoglycans and lectins), cellular adhesion molecules (including N-CAM, L1, N-cadherin), and neuronal receptor ligands (including receptor agonists, receptor antagonists, peptidomimetic molecules, and antibodies).

10. The method of claim 8, wherein said neuronal factor is administered with the bone marrow-derived cells.

11. The method of claim 8, wherein said neuronal factor is administered separately from said bone marrow-derived cells.

12. The method of claim 11, wherein said neuronal factor is administered intrathecally.

13. The method of claim 1, further comprising the step of mildly damaging the nervous system of the individual.

14. The method of claim 1, wherein said bone marrow-derived cells are administered by vascular administration.

15. The method of claim 14, wherein said bone marrow-derived cells are administered by intravenous administration.

16. The method of claim 15, wherein said bone marrow-derived cells are administered by intravenous infusion.

17. The method of claim 16, wherein said intravenous infusion is into a peripheral vein.

18. The method of claim 1, wherein said bone marrow-derived cells are administered intrathecally.

19. The method of claim 1, wherein said bone marrow-derived cells are administered by direct administration into a site in said subject's nervous system.

20. The method of claim 19, wherein said site in the subject's nervous system is in the subject's central nervous system (CNS).

21. The method of claim 1, wherein said subject is a human.

22. A method for improving memory function in an individual with deficient memory function, comprising:

administering bone marrow-derived cells to an individual having deficient memory function, wherein the administering of the bone marrow-derived cells induces a formation of new neurons in a nervous system of the subject; and

improving at least one memory function in said individual.

23. The method of claim 22, wherein said bone marrow-derived cells are autologous.

24. The method of claim 23, wherein said autologous bone marrow-derived cells are genetically modified.

25. The method of claim 22, wherein said bone marrow-derived cells are allogeneic.

26. The method of claim 25, wherein said allogeneic bone marrow-derived cells are genetically modified.

27. The method of claim 22, wherein said bone marrow-derived cells are administered in conjunction with a neuronal factor.

28. The method of claim 27, wherein said neuronal factor is selected from the group consisting of wherein said neuronal factor is selected from the group consisting of nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF), neurotrophin-3, -4, -5, –4/5 and -6 (NT-3, -4, -5, -4/5, -6), ciliary neurotrophic factor (CNTF), glial-derived neurotrophic factor (GDNF), growth promoting activity (GPA), luteinizing hormone releasing hormone (LHRH), *KAL* gene, insulin, insulin-like growth factor-I-alpha, I-beta, and -II (IGF-I-alpha, I-beta, -II), interleukins (*e.g.*, IL-2, IL-6, and the like), platelet derived growth factors (including homodimers and heterodimers of PDGF A, B, and v-sis), retinoic acid (especially all-*trans*-retinoic acid), fibroblast growth factors (FGFs, *e.g.*, FGF-1, -2, -3), epidermal growth factor (EGF), leukemia inhibitory factor (LIF), the neuropeptide CGRP, vasoactive intestinal peptide (VIP), gliobastoma-derived T cell suppressor factor (GTSF), transforming growth factor alpha, epidermal growth factor, transforming growth factor betas (including TGF-β1, -β2, -β3, -β4, and -β5), vascular endothelial growth factors (including VEGF-1, -2, -3, -4, and -5), stem cell factor (SCF), neuregulins and neuregulin family members (including neuregulin-1 and heregulin), netrins, galanin, substance P, tyrosine, somatostatin, enkephalin, ephrins, bone morphogenetic protein (BMP) family members (including BMP-1, -2, -3 and -4), semiphorins, glucocorticoids (including dexamethasone), progesterone, putrescine, supplemental serum, extracellular matrix factors (including laminins, fibronectin, collagens, glycoproteins, proteoglycans and lectins), cellular adhesion molecules (including N-CAM, L1, N-cadherin), and neuronal receptor ligands (including receptor agonists, receptor antagonists, peptidomimetic molecules, and antibodies).

29. The method of claim 27, wherein said neuronal factor is administered with the bone marrow-derived cells.

30. The method of claim 27, wherein said neuronal factor is administered separately from said bone marrow-derived cells.

31. The method of claim 30, wherein said neuronal factor is administered intrathecally.

32. The method of claim 22, wherein said memory function is a short term memory function.

33. The method of claim 22, wherein improving said memory function comprises stabilizing said memory function.

34. A method for treating a neuronal deficiency, comprising:

administering a bone marrow cell mobilization therapy to an individual having a neuron deficiency, wherein the administering of the bone marrow cell mobilization therapy induces formation of new neurons in the nervous system of the subject; and

ameliorating at least one symptom of the neuronal deficiency.